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How to stop the destruction of Amazonia

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IN 1995, destruction of the Brazilian rainforest hit an all-time high. The government had just instigated its "Real Plan", creating a new currency pegged to the US dollar to stabilise rampant hyperinflation, which had been running at over 2000 per cent. Years' worth of private funds that had been held by government-controlled banks were suddenly freed for investment. That year, developers went into overdrive, destroying almost 3 million hectares of rainforest. Much of it was simply burned to make way for cattle ranches. Few Brazilians imagined that forest destruction would ever again approach such a pace. The latest figures have proved them tragically wrong.

Admittedly, it should not come as a big surprise. Deforestation rates fluctuate with changing economic conditions and occasional El Niño droughts, but the overall trend is clear: destruction in Brazilian Amazonia surged from around 14,000 square kilometres per year in the early 1990s to 20,000 km² a year between 1995 and 2001, and over 24,000 km² a year from 2002 to 2004. The present rate is roughly equivalent to an area the size of New York's Central Park disappearing every hour, or of Belgium being razed and burnt each year.

The last three years have probably been the worst consecutive three in the basin's history. And 2004 was the second-worst on record, with a rate of destruction greater even than the severe drought years of 1997 and 1998, when a single fire consumed over 10,000 km² of forest in Roraima in northern Brazil. The city of Manaus, where I lived, was forced to close its international airport for days because incoming pilots couldn't see through the acrid smoke. At 26,000 km², deforestation in 2004 was second only to 1995.

The situation is shocking, and not just for conservationists or biologists like myself. It is a problem for Brazil, which as owner and caretaker of two-fifths of the world's remaining tropical rainforest, must contend with the expectations of a global community that is appalled by rapid forest destruction. It is also an issue that should concern us all, because as well as being a verdant carpet that covers a third of South America and an incredible refuge for plant and animal diversity, the rainforest is an enormous heat sink that helps drive global weather patterns. My personal belief is that Amazonia is not a lost cause. But if things are to change we need to tackle some tough questions. Why is deforestation accelerating? And why does the Brazilian government seem unable to control it?

Seeds of destruction

Part of the answer is that the Amazon we see today is the product of long-term government policies stretching back to the 1960s. Then, Brazil's military dictators began initiatives to populate and exploit the basin, in large part because of fears that nations such as Colombia or the US might attempt to wrest control of the region and its rich natural resources. To achieve this the government began to build roads and infrastructure, such as the vast Transamazon Highway. It also encouraged immigration into the basin via generous tax incentives for cattle ranchers, a free-trade zone to attract industries, and massive colonisation projects that shifted hundreds of thousands of poor people from rural and urban areas to eke out a living as slash-and-burn farmers.

Subsequent non-dictatorial leaders of Brazil largely continued these policies. As a consequence, the population of Brazilian Amazonia has grown dramatically, from around 2 million in the early 1960s to over 20 million today. Rainforest cities have sprung up, including Manaus, which quickly grew from a sleepy regional centre to a

sprawling metropolis of 1.6 million people.

Today, the rapidly expanding population of the Amazon - much of which is poor, in both rural and urban areas - is demanding more economic development. In the eyes of many residents this means more roads, more logging, more ranching and more industry. Over the past decade, these desires have been fuelled by a 60 per cent decline in the value of the Brazilian real relative to the US dollar, which has greatly increased the competitiveness of exports.

“Brazil is the most heavily indebted nation in the world, owing around \$250 billion”

Since 1990, the size of the Amazonian cattle herd has increased from 20 million to 60 million head - the largest of any country in the world. Over the same period, the area devoted to large-scale soya farms in Brazil has doubled from 10 million to 20 million hectares, with soya exports now totalling about \$10 billion annually. Timber cutting has also grown exponentially. These changes are placing enormous pressures on the Amazon - and the biggest beneficiaries are wealthy landowners and corporations.

Brazil's export boom is also driven by its foreign debt. The country has been a profligate borrower for decades, encouraged by international lenders flush with petrodollars. It is now the most heavily indebted nation in the world, owing around \$250 billion, and using an astonishing three-quarters of its foreign earnings to service its external debt. Most of the debt and interest must be paid in dollars and, because the real has dropped sharply in value against the greenback over the past decade, pressure to produce international exports like timber, beef and soya is at an all-time high.

Amazonian deforestation has become a juggernaut with enormous momentum, and nobody is more aware of this than Brazil's president Luiz Inácio Lula da Silva. Following Lula's election in 2002, many expected this charismatic former union leader and left-leaning activist to be a relatively pro-environment president, and he does indeed get good marks for several aspects of his conservation policy. His choice of Marina Silva as minister of the environment is widely applauded. Silva, who was raised by rubber-tappers in the rainforests of Rondônia, is unquestionably dedicated to the task, though some feel she has tried too hard to put a positive spin on the recent appalling deforestation figures.

Lula is also praised for hiring several hundred new field personnel for IBAMA, Brazil's hard-pressed environmental protection agency, which has always been too poorly staffed and funded to effectively police the immense and unruly Amazonian frontier. And Lula responded strongly, if belatedly, to the huge deforestation in 2003, allocating \$140 million to boost monitoring and enforcement against illegal logging and burning.

For anyone unfamiliar with the Brazilian Amazon, the scale of lawlessness and corruption can be difficult to conceive. The government itself estimates that 80 per cent of all logging in the region is illegal - meaning timber is effectively stolen, with no payment of royalties or environmental control over how the timber is harvested. Predatory loggers and illegal gold miners have invaded countless national parks and Native American reserves, and drug smuggling is becoming increasingly common. Because of Brazil's labyrinthine court system, IBAMA has struggled to extract fines from environmental offenders, but to be fair to Lula, he has had some success in fighting illegal logging. In a recent crackdown, for example, the government arrested 90 people, including nearly 40 staff from IBAMA, among them the state chief for Mato Grosso. During the past decade, this cartel was responsible for an estimated \$370 million in stolen timber.

Worst offenders

The government has done far less to reduce illegal colonisation of forests - especially by landless peasants. This is perhaps unsurprising given that Lula himself survived a hard-scrabble upbringing in an impoverished village in the north-eastern corner of the country, and has made tackling poverty a top priority.

Despite a continuing influx of people into the region, the rate of deforestation has roughly stabilised in seven of the nine Brazilian states that lie wholly or partly within the Amazon Basin. The great majority of the increase now occurs in just two of the largest states, Pará and Mato Grosso, where the situation seems increasingly out of control (see Map).

Mato Grosso, a province along the southern margin of the Amazon, is the home of Blairo Maggi, also known as the *rei da soja*, or soybean king. Governor of the state since 2003, Maggi commands the world's largest soybean empire, with sales of over \$600 million last year. Maggi is often accused of being zealously pro-development, especially where soya farming is concerned. When deforestation in Mato Grosso jumped by 40 per cent during his first year in office, he responded by saying that it "doesn't mean anything" and that he felt "not the slightest bit guilty". In 2004, nearly half of all forest destruction in Amazonia was in his state.

Pará is notoriously lawless. This is the place where, earlier this year, a 74-year-old American nun called Dorothy Stang was executed by two men working for a local cattle rancher. Stang had long fought to protect peasant farmers from rapacious forest loss and exploitation. Her assassins let her read a final passage from the Bible before riddling her with bullets. This shocking murder spurred Lula to impose a sharp crackdown in Pará, with 2000 troops temporarily dispatched to help guard the rural towns and forests.

Lula and his ministers seem perplexed by the skyrocketing rates of forest clearance and the attendant international condemnation. As they see it, they are struggling to balance equally urgent needs for environmental protection and economic progress. Critics, however, argue that the government has a profoundly split personality. Some parts are preoccupied with conservation and sustainable development, others concern themselves with colonisation and economic growth. The problem is that the pro-development ministries are far more powerful than those responsible for environmental protection. As Philip Fearnside, a leading expert in Amazon development from Brazil's National Institute for Amazonian Research, puts it: "Every time the economy and environment have gone head-to-head under Lula, the environment has lost."

["The scale of lawlessness and corruption can be difficult to conceive"](#)

Nowhere is this dichotomy more apparent than in the long, acrimonious debate over *Avança Brasil*, or Advance Brazil, (recently renamed Brazil for All) an avalanche of infrastructure projects proposed in 2000 that would dramatically alter the Amazon. Under Advance Brazil, the government plans to pave over 7000 kilometres of new Amazonian highways, canalise vast rivers and construct dozens of railways, hydroelectric reservoirs, gas lines and power lines that will ramify across the basin. Altogether, the plans entail a mammoth investment of around \$20 billion in infrastructure. Several of the biggest projects, including massive highways and oil pipelines, are already well under way.

In 2001, my colleagues and I published a paper in *Science* that helped alert the world to the likely impacts of Advance Brazil (*Science*, vol 291, p 438). Much of the planned infrastructure will penetrate deep into the pristine heart of the Amazon, providing likely corridors for invasions by slash-and-burn farmers, ranchers, loggers and land speculators. This would be like opening Pandora's box, we argued, unleashing an unprecedented wave of forest loss and degradation. Equally alarming is the prospect that the basin's forests will be chopped into disjunct fragments, which are far more vulnerable to predatory logging and wildfires.

Our findings generated controversy worldwide, and we were attacked in Brazil, especially by the ministries that actively plan and promote the projects. Criticisms by the Ministry of Science and Technology, whose leader was a key architect of Advance Brazil, became so acrimonious that Brazil's largest newspaper published an editorial defending us - saying that the Ministry should evaluate our projections objectively rather than simply trying to "kill the messenger".

Before our study, Brazilian and US researchers were beginning to scrutinise the planned highways, but no one had attempted to assess the overall impact of the panoply of projects. The Ministry for

the Environment was largely excluded from the planning process, especially during the critical early phases. To Lula's credit, as soon as he took office he ordered a council of 11 ministries with interests in the projects to evaluate the environmental impacts. The Inter-Ministerial Council's detailed report concluded that a number of the planned mega-projects - including two new highways that would slice across the basin - would indeed have severe environmental ramifications, particularly by promoting large-scale forest invasions. This was a golden opportunity to change the direction of forest exploitation, but several pro-development state governments in the Amazon protested, and the federal government caved in. A few environmental add-ons (such as new nature reserves) were eventually included within Advance Brazil, but none of the planned projects was halted.

[“Our findings generated controversy worldwide and attacks in Brazil”](#)

Brazil, like many nations, wants to have its cake and eat it too. It needs economic development, and it wants to slow Amazon deforestation, but these aims are difficult to reconcile, as the Advance Brazil debate clearly shows. Perhaps it also helps explain why Lula's efforts to control deforestation have been mostly reactive rather than proactive.

But does all this mean that the Amazon is a lost cause? The answer is emphatically no. The region is suffering a terrible toll, but the forests are simply too enormous to disappear quickly. There are, moreover, vital opportunities to improve the outlook for the future. Decisions made in the next decade will profoundly affect the balance between environmental peril and preservation.

Within Brazil, an essential priority is to integrate the activities of ministries that control and promote development projects with those of the Ministry of the Environment. Lula's Inter-Ministerial Council has already laid the foundation, and the critical step now is for the federal government to summon the political courage to follow its recommendations.

Another key priority is stricter enforcement of environmental laws and better monitoring of transgressors in the remote Amazonian frontier. Increasingly, private environmental groups are aiding in this task. Greenpeace Brazil, for example, has become adept at tracking down and intercepting illegal loggers within the labyrinthine waterways, while Friends of the Earth-Brazilian Amazonia has been training rural communities to prevent and fight destructive wildfires. Such efforts, together with the government's crackdown on illegal logging, may be starting to bear fruit: preliminary estimates suggest that in 2005 deforestation could fall to around 16,000 km², though many believe a key reason for this is a temporary drop in soya and beef prices, which reduces incentives for forest clearing.

Eyes on the US

From an international perspective, it is vital that people lobby major lending agencies, such as the World Bank, International Monetary Fund and Inter-American Development Bank, to base any future investments in Amazonia on sound environmental policies. Although this already happens in theory, in practice investments have sometimes misfired spectacularly. The World Bank, for example, has lent \$60 million to the state of Mato Grosso to help expand soybean production. Because the World Bank supposedly adheres to strict environmental protocols, several other European and Brazilian banks quickly followed suit, providing hundreds of millions of dollars in loans to the state. The result, starkly apparent in recent years, has been a catastrophe for the rainforest.

Brazil also urgently needs more international support for its Amazon conservation initiatives. To date, the most generous financial aid has come from European nations - especially Germany - via an international initiative called the Pilot Program to Conserve the Brazilian Rainforest. Established in 1994, this aims to channel over \$400 million into conservation and sustainable development. Despite flaws such as cumbersome bureaucracy, it has had some notable successes, including promoting the designation of 22 million hectares of new Native American reserves.

Sadly, the US contribution to the Pilot Program is appallingly small relative to its economy - less than \$20 million. And although the US Agency for International Development has promised an additional \$10 million per year for other Amazon conservation projects, US contributions are still paltry compared with what many European nations are giving.

The US is failing in another way, too. In late 2001, I thought I was fortunate to be invited to Brazil's National Congress to testify about the impacts of Amazon deforestation on global climate. To my great chagrin, my talk took place just three days after President George Bush announced that the US was withdrawing from the Kyoto protocol. The Brazilians were livid, with speaker after speaker taking the podium to denounce Americans for our failure to honour our international responsibilities. Following my testimony, a young Brazilian approached me and politely but pointedly enquired if I thought the US had become "the new evil empire".

It is difficult to overstate how badly the US's reputation on environmental issues has suffered in recent years. As an American who has spent the past 20 years living and working in the tropics, I have become increasingly convinced that my country must lead by example. It doesn't matter where you are in the world, the US, as the greatest economic and military power of our era, is watched with extraordinary care.

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Other countries have long regarded us as a consumerist, wasteful nation - where, for example, the average person produces 100 times more greenhouse gases than someone living in Bangladesh. At the same time we often exhort nations such as Brazil, which already bear a disproportionately heavy burden for conservation, to do better. No wonder this leads to burning resentments and cries of hypocrisy. If we hope to have a shred of credibility and influence internationally, we must not only encourage nations like Brazil to develop more sustainably, we must also put our own house in order.

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